AGRICULTURE

Success Story

IRRIGATION VALVE SOLENOID ENERGY SAVER

Benefits

- Eliminates all primary wiring needed to operate valves
- Reduces over 99% of the energy needed to automate irrigation systems
- Has saved about 7 million Btu nationwide through 2000
- Saves the energy used to manufacture copper wire and the pollution created in making and transporting it

Applications

A battery-operated electronic controller used to turn irrigation valves on and off anywhere such systems are used, including

- Shopping centers
- Golf courses
- Median strips and islands
- Housing developments
- Remote locations
- Schools and parks
- Playgrounds
- Agricultural applications.

New Battery-Powered Controllers Save Energy in Irrigation Applications

Automated sprinkler irrigation systems normally use 24-volt alternating current (AC) solenoids that require a constant flow of electricity to keep the valves and contollers operating. Typically, power is not available near the valves, so long runs of copper wire are needed to supply power to the control systems. The control systems are subject to power and lightning surges that can damage equipment and create hazards.

Battery-powered direct-current (DC) controllers that solve many of the AC problems have been available for over 20 years, but they have very limited battery life, and the control needs to be located near the valve to provide sufficient power. In addition, the valve box versions have not been completely submersible, and they have been unreliable and difficult to program. Because of all these shortcomings, their use has been limited to applications where no other options are available. Exchanging one set of AC-power-related problems for different DC-related problems has not been the solution.

Technology Description

Automated Sprinkler Irrigation System

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Alex-Tronix Controls has developed several models of energy-efficient control systems. The Alex-Tronix SWELL solenoid energy saver and the Battery Control System (BCS) were developed with assistance from the U.S. Department of Energy's Inventions and Innovation Program. The SWELL saves about 60% of the energy compared with an AC-powered solenoid. The SWELL is a DC latching solenoid that does not require a constant supply of power. Instead, current surges to the solenoid as needed to open and close the valves. This approach saves virtually all the energy used by the solenoid.

The BCS combines the patented circuitry technology similar to the SWELL with the patented battery management technology to deliver a highly efficient irrigation control system. The AC power supply system is eliminated by using a battery. The approach used by the BCS is not limited to irrigation applications. Instead of using a latching solenoid, the BCS can use a latching relay, which can then turn on motors, lights, pumps, or other devices in industrial applications.

BCS Controller

SWELL Unit

Capabilities

Alex-Tronix has several models of energy-efficient control systems in development or production:

The BCS offers

- Ten times the battery life of other battery-powered controllers (up to 10 years)
- One hundred times the valve operating distance of any other battery-powered controller

The Smart-Alex (valve box battery operated controller) offers

- Up to 10 years battery life (compared with 6 months to 1 year for conventional battery systems)
- Programming without opening the valve box cover
- Operating while submerged

The Enercon offers

- A lower cost than the BCS
- Up to 10 years of battery life

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Success Story

Project Partners
- Inventions and Innovation Program
  Washington, DC
- Alex-Tronix Controls
  Fresno, CA

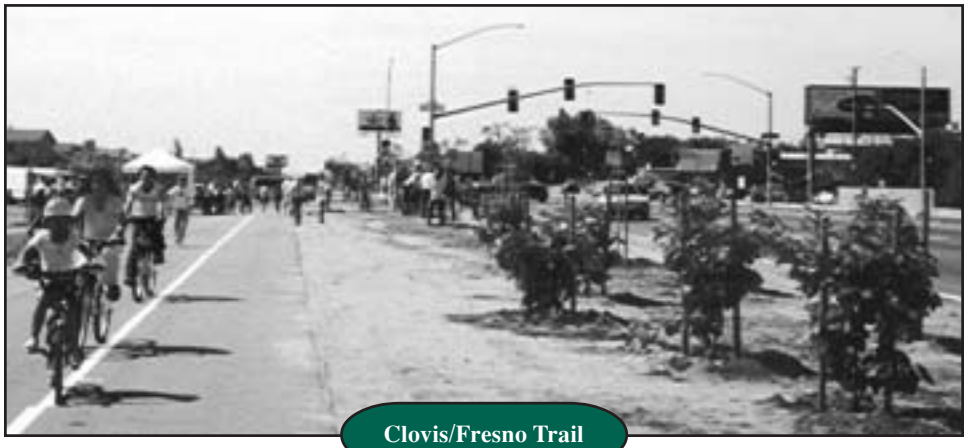
"The I&I grant allowed Alex-Tronix to ship the unit to users for testing. Alex-Tronix considers the grant a mandate to continue developing energy-efficient and environmentally conscious types of systems."

– George Alexanian
President
Alex-Tronix Controls

In the first year of manufacture, approximately 200 BCS units have been sold with no reported field failures. Because of industry's response to the BCS, Alex-Tronix is introducing additional lines of battery-powered controllers in 2001. The Smart-Alex valve box controller is the newest product, to be quickly followed by the Enercon and the Smart-One. Based on customer requests, larger BCS systems were developed late in 2001. Next year, remote and wireless battery-operated control systems are being considered for development.

Technology Application

The City of Fresno is one of many satisfied BCS users in California. Tree Fresno, a community-based nonprofit organization that has planted over 25,000 trees in Fresno County, installed the Alex-Tronix BCS controllers along the eight-mile Clovis/FresnoTrail and for landscape projects in central Fresno. "The City of Fresno has had great success with the BCS and plans to use the BCS on all new median-island landscaping projects," says Susan Stiltz, Tree Fresno Executive Director. "Features of the BCS that we value are that it saves the cost of bringing AC power to the controller location, making landscaping and tree planting economically more feasible, and it saves energy through the use of latching solenoids. This energy-efficient technology is providing essential continuing care for our trees."



Clovis/Fresno Trail

September 2001

Energy Savings and Market Potential

A typical irrigation controller uses about 300 amp-hours of energy per year. Because the BCS is self-powered with internal batteries, virtually this entire amount of energy is saved. About 10 kWh are saved annually per unit or about 7 million Btu per year for the 200 BCS units in operation during 2000 representing about $100 in electricity savings and 1000 lb of avoided CO_2 emissions through 2000. About 1 million irrigation controllers are sold annually in the United States, and probably 30 million are in use that could be replaced with battery-powered controllers. If anticipated sales meet projections, the energy savings could be significant by the year 2010.

The controller can be placed wherever it is convenient, frequently near the valves, so primary wiring is not needed. Eliminating primary wiring saves the energy required to make the copper wiring, the fuel needed to transport it, and the pollution that would have otherwise been released by making and transporting the copper. In terms of saving the cost of copper, Alex-Tronix designed one system that used about $7,000 rather than the normal $27,000 for copper wire. The system saved not only 70% of the normal copper wire costs but also the energy and pollution typically associated with manufacturing the copper wire.

The primary market for this technology is turf irrigation systems because most are automated. Agricultural applications are also a promising market because automated irrigation systems frequently require long runs of wire and multiple valves per station. The BCS, Smart-Alex, and Enercon are not limited to operating irrigation systems. By substituting a latching relay for the latching solenoid, a variety of industrial devices can be remotely operated.

Industry of the Future — Agriculture

Agriculture, a target industry for the Industry of the Future initiative, emphasizes partnerships to develop technologies for using plants, crops, and their wastes as starting materials for industrial products. An agriculture industry team has been formed within Office of Industrial Technologies (OIT) to facilitate agriculture industry/federal government partnerships. This team will leverage resources available to established OIT teams, such as the chemicals and forest products teams, to strengthen the contributions of the agriculture team and to bring new ideas to the service of the agriculture industry.

OIT Agriculture Industry Team Leader: Mark Paster (202) 586-2821.

The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and to conduct early development. Ideas that have significant energy-savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

For project information, contact:

George Alexanian
Alex-Tronix Controls
4761 W. Jacquelyn Avenue
Fresno, CA 93722
Phone: (888) 224-7630
Fax: (559) 276-2890
controls@alex-tronix.com

Visit our home page at
www.alex-tronix.com

For more information about the Inventions and Innovation Program, contact:

Lisa Barnett
Program Manager
Inventions and Innovation Program
U.S. Department of Energy
1000 Independence Avenue SW
Washington, D.C. 20585-0121
Phone: (202) 586-2212
Fax: (202) 586-7114
lisa.barnett@ee.doe.gov

Visit our home page at
www.oit.doe.gov

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